

Claims

We claim:

1. A process for regeneration of a nitrogen oxide storage catalyst, said process comprising:
 - (a) applying a first regeneration strategy when the exhaust gas temperature is above a threshold temperature, wherein said first regeneration strategy comprises changing a lean air/fuel-ratio to a rich air/fuel-ratio during a first regeneration period; and
 - (b) applying a second regeneration strategy when the exhaust gas temperature is below said threshold temperature, wherein said second regeneration strategy comprises switching the air/fuel-ratio between a lean air/fuel-ratio and a rich air/fuel-ratio back and forth forming a sequence of rich pulses and lean pulses, and said sequence has between 2 and 10 rich pulses and between 2 and 10 lean pulses during a second regeneration period.
2. The process according to claim 1, wherein the threshold temperature is between 170°C and 250°C.
3. The process according to claim 1, wherein in step (b) said lean air/fuel-ratio is between 1.5 and 4, said rich air/fuel-ratio is between 0.8 and 0.98, and the threshold temperature is between 170 °C and 250 °C.
4. The process according to claim 3, wherein the duration of the first regeneration period is between 5 and 20 seconds.
5. The process according to claim 4, wherein the lean pulses have a pulse width of between 2 and 10 seconds, and the rich pulses have a pulse width of between 2 and 10 seconds.
6. The process according to claim 5, wherein the ratio of the pulse width of the lean pulses to the pulse width of the rich pulses is between 5:1 and 1:5.

7. The process according to claim 6, wherein the pulse width of the lean pulses is decreased stepwise or continuously from the beginning to the end of said second regeneration period, and the pulse width of the rich pulses is decreased stepwise or continuously from the beginning to the end of said second regeneration period.
8. A process for regeneration of a nitrogen oxide storage catalyst, said process comprising:
- (a) adsorbing nitrogen oxides contained in an exhaust gas by a storage catalyst during normal operating conditions of an engine;
 - (b) desorbing the nitrogen oxides and converting the nitrogen oxides to harmless substances by lowering the air/fuel-ratio to a rich air/fuel-ratio value during a regeneration period; and
 - (c) switching the air/fuel-ratio back and forth between a lean air/fuel-ratio and a rich air/fuel-ratio forming a sequence of lean pulses and rich pulses, and said sequence has between 2 and 10 rich pulses and between 2 and 10 lean pulses during the regeneration period.
9. The process according to claim 8, wherein said lean air/fuel-ratio is between 1.5 and 4 and said rich air/fuel-ratio is between 0.8 and 0.98.
10. The process according to claim 9, wherein the lean pulses have a pulse width of between 2 and 10 seconds and the rich pulses have a pulse width of between 2 and 10 seconds.
11. The process according to claim 10, wherein the ratio of the pulse width of the lean pulses to the pulse width of the rich pulses is between 5:1 and 1:5.
12. The process according to claim 11, wherein the pulse width of the lean pulses is decreased stepwise or continuously from the beginning to the end of said regeneration period, and the pulse width of the rich pulses is decreased stepwise or continuously from the beginning to the end of said regeneration period.

13. A device for regeneration of a nitrogen oxide storage catalyst, said device comprising:

(a) a means for applying a first regeneration strategy when the exhaust gas temperature is above a threshold value, said first regeneration strategy comprising changing the air/fuel-ratio from a lean air/fuel-ratio to a rich air/fuel-ratio value during a first regeneration period; and

(b) a means for applying a second regeneration strategy when the exhaust gas temperature is below said threshold value, said second regeneration strategy comprising a means for switching the air/fuel-ratio between a lean air/fuel-ratio and a rich air/fuel-ratio back and forth forming a sequence of rich pulses and lean-pulses with between 2 and 10 rich pulses and between 2 and 10 lean pulses during a second regeneration period.